FEC

50TH Anniversary

FEC CABLES (M) SDN. BHD.

(7293-W)

ESTABLISHED SINCE 1967

INSTRUMENTATION CABLES 300/500V

MEMBER'S OF:

MCMA

MALAYSIAN CABLE MANUFACTURERS ASSOCIATION

ISO 9001

BUREAU VERITAS Certification

CORPORATE HISTORY

FEC Cables (M) Sdn. Bhd. was first established in 1967 and was previously known as Furukawa Electric Cables (M) Sdn. Bhd. In all the years until 2003, the company had been under the management and control of Furukawa Electric Co. Ltd. of Japan.

In 2003, the company was renamed FEC Cables (M) Sdn Bhd. In 2016, Forfren Sdn Bhd had acquired a majority stake of 81% in the company and has extensive experience in the cables industry.

The Company had started a technical collaboration from world renowned cable manufacturer, The Furukawa Electric Co. Ltd Japan (Furukawa Japan).

FEC Cables has benefited enormously from the technical collaboration and the subsequent technology transfer with Furukawa Japan. FEC Cables inherited from Furukawa Japan not only its advanced technology and technical know-how but also the disciplines of producing quality products using material conforming to the international standards of manufacturing cables.

Today FEC Cables plays a prominent role as a forerunner in the cable industry. FEC Cables has been actively involved in serving various industrial sectors, namely the power, telecommunications, construction as well as the oil and gas sectors.

INTRODUCTION OF COMPANY

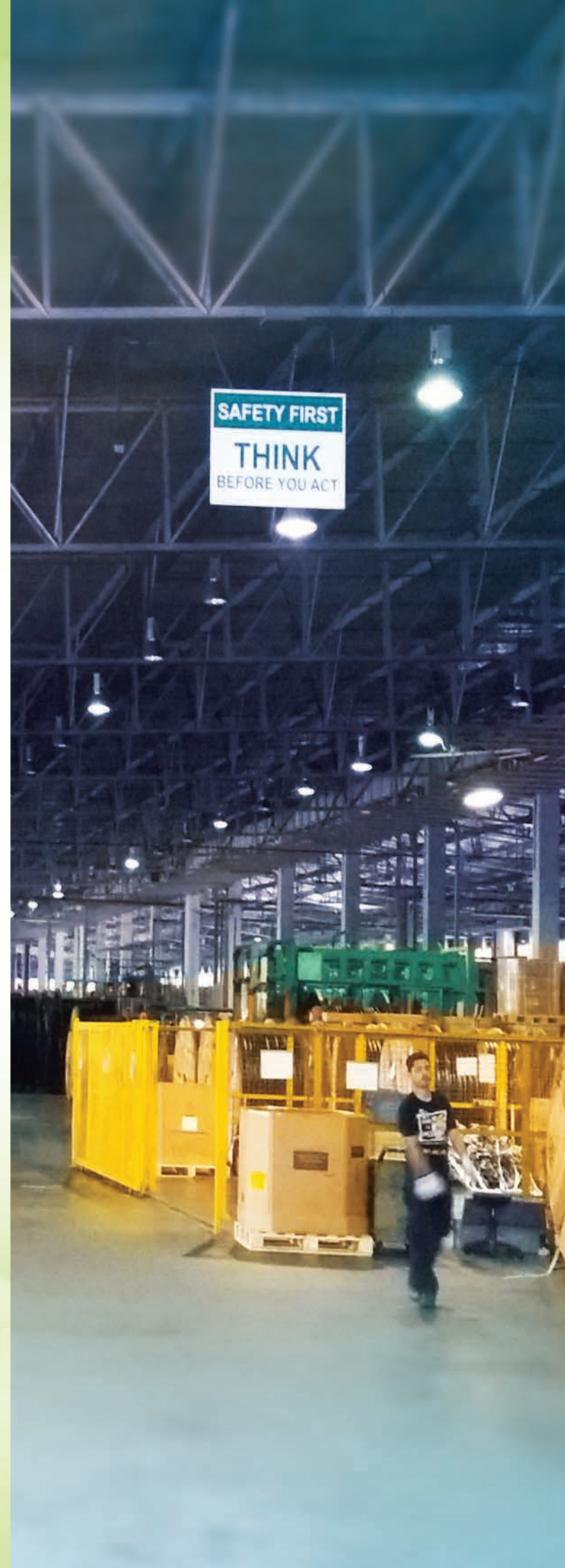
When there is talk of high quality electric wires and cables, the one company that comes to mind is FEC CABLES (Malaysia) SDN BHD. FEC formerly known as FURUKAWA ELECTRIC CABLES (M) SDN BHD. Having established its Shah Alam plant in 1967 on 7 acresite at Shah Alam Industrial Estate, Furukawa has come a long way.

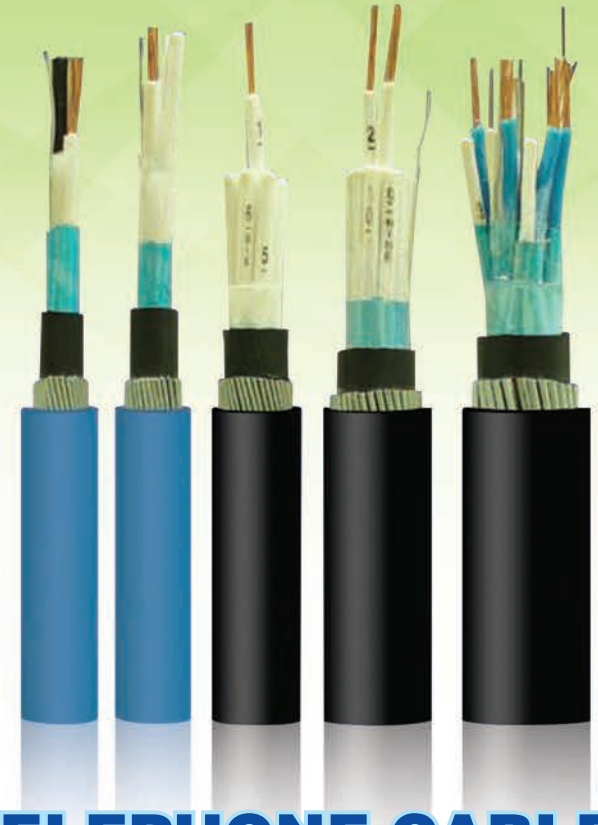
The technical collaboration with our Japanese counterpart, Furukawa Japan, has brought about an amazing success for us. In terms of quality, we have climbed the ladders of product manufacturing, steadily and successfully, pushing FEC towards the pinnacle of excellence.

Putting our customers' demands and needs as our number one priority, we opened our second plant in 1995, on a 27-acre freehold land site in Bukit Raja Industrial area, Klang. In our quest for excellence, we equip the plant with the latest technological aids for the manufacture of a wide range of low and medium voltage cables.

The certification of the ISO 9001 for both plants only proves that we do not compromise on quality and customer satisfaction. Our dedicated and hard-working employees are the backbone of our success. This was greatly helped by the State-of-the-art technology equipment which has led us towards excellence.

Moving towards a new century, we pledge to continually strive towards progressive and dynamic growth as FEC Cables continues its efforts in contributing to the development of Malaysia.





TELEPHONE CABLES

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PVC/PVC/SWA/PVC-SLA

Multitriple, Individual triple screen
PVC/PVC-TSLA
PVC/PVC/SWA/PVC-TSLA

MULTIPAIR CABLE

APPLICABLE STANDARDS

BS 5308 Part 1 (Type 1 & Type 2)
BS 6746 / BS 7655
BS 6234
BS 6360 (IEC 60228)
BS 4066 Part 1 (IEC 60332-1) & IEC 60332-3 (if required)

CONSTRUCTION

Conductor	:	Plain annealed copper wires according to BS 6360 (IEC 60228)
Insulation	:	Polyethylene type 03 according to BS 6234 or equivalent compound
Colour code	:	Refer to theTable 3
Pairing	:	Cores twisted to pairs (two pairs cable can be manufactured as a quad for collective screen cables)
Binder	:	Non-hygroscopic Polyester tape
Drain wire	:	Tinned annealed copper wire 0.5mm2 (1/0.80mm)
Screen	:	Aluminium/Polyester tape approx. 0.022mm thick over Drain ware
Bedding (Inner sheath)	:	Polyethylene type 03 Black colour according to BS 6234 or equivalent compound
Armour	:	Galvanized steel wires
Sheath/Oversheath	:	PVC compound type TM1 Black colour according to BS 6746 / BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic compound (LSNHFR) to BS 4066 Part 1 & 3 (IEC 60332-1 & 3) if required.
Cable Identification	:	Manufacturer's name and voltage

APPLICATION

For transmission of analogue and digital signals in and around process plants in dry and damp industrial areas.

(Non-armoured cables : not recommended for underground burial)

MINIMUM BENDING RADIUS

Non-armoured cable	- During operation	: 6 X Overall diameter
	- During installation	: 8 X Overall diameter
Armoured cable	- During operation	: 8 X Overall diameter
	- During installation	: 10 X Overall diameter

TEMPERATURE RATING

During operation	: -30°C up to +70°C
During installation	: -10°C up to +50°C

ABBREVIATIONS

- PE : Polyethylene
- SLA : Aluminium/Polyester tape collective screen
- SWA : Steel wire armour
- PSLA : Aluminium/Polyester tape pair screen
- PVC : Polyvinyl Chloride

MULTIPAIR CABLE

Table 1 Collective Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)						
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	
0.50mm² (1/0.80mm)	1	0.5	0.8	5.5	37	0.8	5.4	0.9	1.3	10	185	
	2		0.8	6	53	0.8	6.1	0.9	1.3	10.5	215	
	3		0.9	8.5	77	0.9	8.4	0.9	1.4	13	295	
	5		1.1	10.5	120	1.1	10.6	0.9	1.4	15	395	
	10		1.2	14	210	1.2	14.2	1.25	1.6	20	690	
	15		1.2	17	295	1.2	16.9	1.25	1.6	22.5	855	
	20		1.3	19.5	385	1.3	19.3	1.6	1.7	26	1,180	
	24		1.3	21	445	1.3	20.8	1.6	1.7	27.5	1,310	
	30		1.3	23	540	1.3	23.0	1.6	1.8	30	1,495	
0.50mm² (7/0.30mm)	1	0.6	0.8	6	42	0.8	6	0.9	1.3	10.5	200	
	2		0.8	7	60	0.8	6.8	0.9	1.3	11	235	
	3		0.9	9.5	87	0.9	9.4	0.9	1.4	14	335	
	5		1.1	12	135	1.1	12	0.9	1.5	17	450	
	10		1.2	16	240	1.2	16.2	1.25	1.6	22	790	
	15		1.3	19.5	340	1.3	19.4	1.6	1.7	26	1,145	
	20		1.3	22	435	1.3	22	1.6	1.8	29	1,360	
	24		1.3	24	505	1.3	23.9	1.6	1.8	30.5	1,510	
	30		1.5	26.5	640	1.5	26.7	1.6	1.9	33.5	1,770	
0.75mm² (1/0.96mm)	1	0.6	0.8	6	47	0.8	6.1	0.9	1.3	10.5	210	
	2		0.8	7	69	0.8	7	0.9	1.3	11.5	250	
	3		0.9	9.5	100	0.9	9.6	0.9	1.4	14	350	
	5		1.1	12.5	155	1.1	12.3	0.9	1.5	17	480	
	10		1.2	16.5	280	1.2	16.6	1.25	1.6	22.5	840	
	15		1.3	20	405	1.3	19.9	1.6	1.7	26.5	1,225	
	20		1.3	22.5	515	1.3	22.6	1.6	1.8	29.5	1,465	
	24		1.5	25	625	1.5	24.9	1.6	1.8	31.5	1,660	
	30		1.5	27.5	760	1.5	27.4	1.6	1.9	34.5	1,910	
0.75mm² (7/0.37mm)	1	0.6	0.8	6.5	50	0.8	6.4	0.9	1.3	11	220	
	2		0.8	7.5	74	0.8	7.3	0.9	1.4	12	265	
	3		1.1	10.5	115	1.1	10.6	0.9	1.4	15	385	
	5		1.2	13	175	1.2	13.2	1.25	1.5	18.5	615	
	10		1.3	17.5	315	1.3	17.7	1.25	1.6	23	900	
	15		1.3	21	440	1.3	21.1	1.6	1.7	27.5	1,320	
	20		1.5	24	580	1.5	23.9	1.6	1.8	30.5	1,600	
	24		1.5	26.5	680	1.5	26.4	1.6	1.9	33.5	1,790	
	30		1.7	29	825	1.7	29.1	1.6	1.9	36	2,060	

MULTIPAIR CABLE

Table 1 (Cont'd) Collective Screen											
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
1.0mm² (1/1.13mm)	1	0.6	0.8	6.5	55	0.8	6.4	0.9	1.3	11	225
	2		0.8	7.5	83	0.8	7.4	0.9	1.4	12	275
	3		1.1	10.5	125	1.1	10.6	0.9	1.4	15	405
	5		1.2	13	195	1.2	13.2	1.25	1.5	18.5	635
	10		1.2	17.5	345	1.2	17.7	1.25	1.7	23.5	945
	15		1.3	21.5	500	1.3	21.3	1.6	1.8	28	1,380
	20		1.5	24.5	665	1.5	24.5	1.6	1.8	31.5	1,675
	24		1.5	26.5	775	1.5	26.6	1.6	1.9	33.5	1,900
	30		1.5	29.5	945	1.5	29.3	1.6	2.0	36.5	2,210
1.0mm² (7/0.43mm)	1	0.6	0.8	6.5	58	0.8	6.7	0.9	1.3	11	235
	2		0.8	8	88	0.8	7.8	0.9	1.4	12.5	290
	3		1.1	11	135	1.1	11.2	0.9	1.5	16	435
	5		1.2	14	210	1.2	14	1.25	1.5	19.5	675
	10		1.3	19	375	1.3	18.9	1.6	1.7	25.5	1,170
	15		1.3	22.5	535	1.3	22.5	1.6	1.8	29.5	1,485
	20		1.5	26	710	1.5	26	1.6	1.9	33	1,815
	24		1.5	28	830	1.5	28.2	1.6	1.9	35	2,035
	30		1.7	31.5	1,040	1.7	31.5	2.0	2.0	39.5	2,640
1.5mm² (7/0.53mm)	1	0.6	0.8	7.5	73	0.8	7.3	0.9	1.4	12	265
	2		0.9	8.5	115	0.9	8.7	0.9	1.4	13.5	335
	3		1.2	12.5	180	1.2	12.5	1.25	1.5	18	595
	5		1.2	15.5	270	1.2	15.4	1.25	1.6	21	790
	10		1.3	21	500	1.3	20.9	1.6	1.8	27.5	1,380
	15		1.5	25.5	735	1.5	25.3	1.6	1.9	32.5	1,815
	20		1.5	28.5	950	1.5	28.7	2.0	2.0	36.5	2,200
	24		1.7	31.5	1,145	1.7	31.6	2.0	2.0	39.5	2,780
	30		1.7	35	1,400	1.7	34.9	2.0	2.1	43	3,215

MULTIPAIR CABLE

Table 2 Individual Pair Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	2	0.5	0.9	9.5	81	0.9	9.4	0.9	1.4	14	320
	3		1.1	10.5	105	1.1	10.4	0.9	1.4	15	355
	5		1.2	12.5	155	1.2	12.6	1.25	1.5	18	560
	10		1.2	17.5	280	1.2	17.5	1.25	1.7	23.5	825
	15		1.3	19.5	375	1.3	19.7	1.6	1.7	26.5	1,135
	20		1.3	22	470	1.3	22.1	1.6	1.8	29	1,320
	24		1.5	25.5	600	1.5	25.6	1.6	1.9	32.5	1,580
	30		1.5	27	700	1.5	27.1	1.6	1.9	34	1,735
0.50mm² (7/0.30mm)	2	0.6	1.1	11	100	1.1	10.9	0.9	1.5	15.5	380
	3		1.1	11.5	120	1.1	11.6	0.9	1.5	16.5	410
	5		1.2	14	175	1.2	14.2	1.25	1.6	20	625
	10		1.3	20	330	1.3	20.0	1.6	1.8	27	1,105
	15		1.5	23	450	1.5	22.8	1.6	1.8	29.5	1,320
	20		1.5	25.5	565	1.5	25.5	1.6	1.9	32.5	1,540
	24		1.5	29	700	1.5	29.1	1.6	1.9	36	1,795
	30		1.7	31.5	835	1.7	31.3	2.0	2.1	39.5	2,290
0.75mm² (1/0.96mm)	2	0.6	1.1	11	110	1.1	11.2	0.9	1.5	16	390
	3		1.1	12	135	1.1	11.9	0.9	1.5	16.5	425
	5		1.2	14.5	200	1.2	14.5	1.25	1.6	20	660
	10		1.3	20.5	380	1.3	20.5	1.6	1.7	27	1,160
	15		1.3	23	495	1.3	22.9	1.6	1.8	29.5	1,370
	20		1.5	26	655	1.5	26.1	1.6	1.9	33	1,650
	24		1.5	30	805	1.5	29.8	1.6	1.9	37	1,920
	30		1.7	32	970	1.7	32.0	2.0	2.0	40	2,435
0.75mm² (7/0.37mm)	2	0.6	1.1	12	120	1.1	11.8	0.9	1.5	16.5	410
	3		1.2	12.5	150	1.2	12.7	1.25	1.5	18	555
	5		1.2	15.5	215	1.2	15.3	1.25	1.6	21	700
	10		1.3	21.5	410	1.3	21.6	1.6	1.7	28	1,230
	15		1.5	24.5	560	1.5	24.6	1.6	1.8	31.5	1,485
	20		1.5	27.5	710	1.5	27.6	1.6	1.9	34.5	1,765
	24		1.7	32	905	1.7	31.9	2.0	2.0	40	2,370
	30		1.7	34	1050	1.7	33.9	2.0	2.1	42	2,625

MULTIPAIR CABLE

Table 2 (cont'd) Individual Pair Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
1.0mm² (1/1.13mm)	2	0.6	1.1	12	130	1.1	11.8	0.9	1.5	16.5	410
	3		1.2	13	160	1.2	12.8	1.25	1.5	18.5	570
	5		1.2	15.5	235	1.2	15.4	1.25	1.6	21	725
	10		1.3	22	455	1.3	21.8	1.6	1.8	28.5	1,285
	15		1.5	25	625	1.5	24.8	1.6	1.9	32	1,580
	20		1.7	28	815	1.7	28.2	2.0	2.0	36	2,135
	24		1.7	32	1,005	1.7	32.1	2.0	2.0	40	2,475
	30		2.0	34.5	1,220	2.0	34.7	2.0	2.2	43	2,830
1.0mm² (7/0.43mm)	2	0.6	1.2	12.5	145	1.2	12.7	1.25	1.5	18	550
	3		1.2	13.5	175	1.2	13.4	1.25	1.5	19	600
	5		1.2	16	255	1.2	16.2	1.25	1.6	22	765
	10		1.3	23	485	1.3	23.0	1.6	1.8	30	1,375
	15		1.5	26	670	1.5	26.2	1.6	1.9	33	1,665
	20		1.5	29.5	850	1.5	29.4	1.6	2.0	36.5	1,980
	24		1.7	34	1,080	1.7	34.0	2.0	2.1	42	2,650
	30		2.0	36.5	1,310	2.0	36.7	2.0	2.2	45	3,005
1.5mm² (7/0.53mm)	2	0.6	1.2	14	180	1.2	13.8	1.25	1.6	19.5	615
	3		1.2	14.5	220	1.2	14.7	1.25	1.6	20.5	680
	5		1.3	18	335	1.3	18.0	1.6	1.7	24.5	1,035
	10		1.5	26	650	1.5	25.8	1.6	1.9	33	1,630
	15		1.7	29.5	900	1.7	29.3	2.0	2.0	37.5	2,250
	20		1.7	33	1,145	1.7	32.8	2.0	2.1	41	2,660
	24		2.0	38	1,460	2.0	38.1	2.0	2.2	46.5	3,220
	30		2.0	40.5	1,715	2.0	40.4	2.5	2.5	50.5	4,020

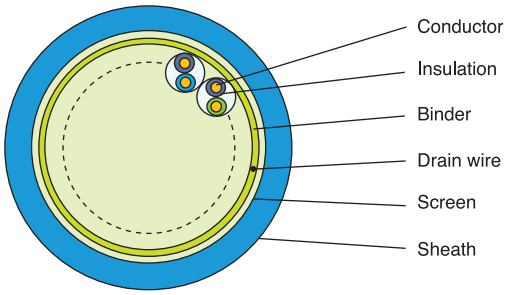
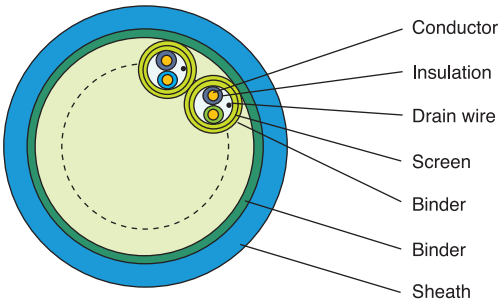
MULTIPAIR CABLE

Table 3 Colour Code (Pair Identification)						
Pair No.	a-wire	b-wire		Pair No.	a-wire	b-wire
1	Black	Blue		16	Black	Orange
2	Black	Green		17	Blue	Orange
3	Blue	Green		18	Green	Orange
4	Black	Brown		19	Brown	Orange
5	Blue	Brown		20	White	Orange
6	Green	Brown		21	Red	Orange
7	Black	White		22	Black	Yellow
8	Blue	White		23	Blue	Yellow
9	Green	White		24	Green	Yellow
10	Brown	White		25	Brown	Yellow
11	Black	Red		26	White	Yellow
12	Blue	Red		27	Red	Yellow
13	Green	Red		28	Orange	Yellow
14	Brown	Red		29	Black	Grey
15	White	Red		30	Blue	Grey

Note : Colour code for Two-pair cable(one quad) : Black, Blue, Green, Brown (colour coded in clockwise order of rotation)

Table 4 Electrial Characteristics									
Electrical Requirements \ Conductor size		mm2 (no./mm)	0.5 (1/0.80)	0.5 (7/0.30)	0.75 (1/0.96)	0.75 (7/0.37)	1.0 (1/1.13)	1.0 (7/0.43)	1.5 (7/0.53)
Conductor resistance at 20°C	(Ω/km)	Max.	36.8	36.7	25.0	25.0	18.4	18.5	12.3
Insulation resistance at 20°C	(MΩ.km)	Min.	5000						
Mutual capacitance at 1 kHz	(nF/km)								
- Collective screen : one-pair & two-pair cable		Max.	115						120
: all other cable			75						85
- Individual screen			115						120
Capacitance unbalance at 1kHz	(pF/250m)	Max.	250						
Inductance / Resistance ratio, L/R	(μH/Ω)	Max.	25						40
Voltage test for 1 minute	Core to core (kV)		1						
	Core to screen (kV)		1						

MULTIPAIR CABLE : CROSS-SECTIONAL OF CABLE

PE/PVC-SLA Collective Screen (Non-armoured Cable)	PE/PVC-PSLA Individual Pair Screen (Non-armoured Cable)
	
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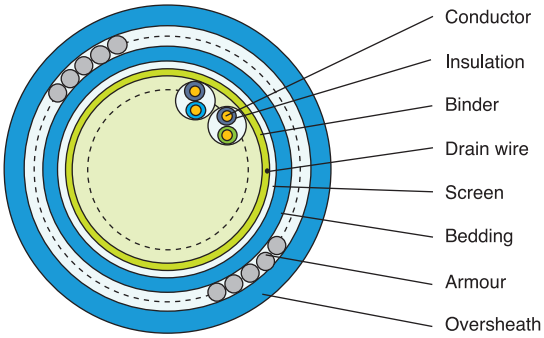
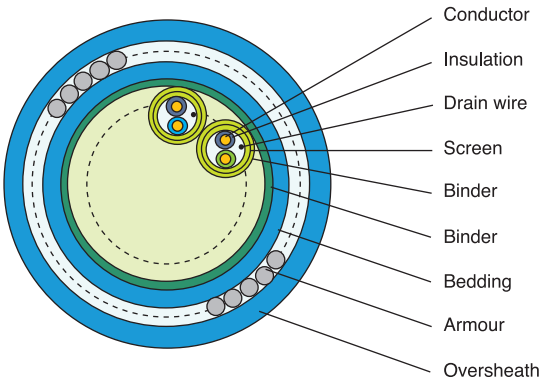
	

MULTITRIPLE CABLE

APPLICABLE STANDARDS

BS 5308 Part 1 (Type 1 & Type 2)
BS 6746/ BS 7655
BS 6234
BS 6360 (IEC 60228)
BS 4066 Part 1 (IEC 60332-1) & IEC 60332-3 (if required)

CONSTRUCTION

Conductor	:	Plain annealed copper wires according to BS 6360 (IEC 60228)
Insulation	:	Polyethylene type 03 according to BS 6234 or equivalent compound
Colour code	:	Refer to the Table 7
Pairing	:	Cores twisted to triples
Binder	:	Non-hygroscopic Polyester tape
Drain wire	:	Tinned annealed copper wire 0.5mm2 (1/0.80mm)
Screen	:	Aluminium/Polyester tape approx. 0.022mm thick over Drain wire
Bedding (Inner sheath)	:	Polyethylene type 03 Black colour according to BS 6234 or equivalent compound
Armour	:	Galvanized steel wires
Sheath/Oversheath	:	PVC compound type TM 1 Black colour according to BS 6746 / BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic compound (LSNHFR) to BS 4066 Part 1&3 (IEC 60332-1&3) if required.
Cable Identification	:	Manufacturer's name and voltage

APPLICATION

For transmission of analogue and digital signals in and around process plants in dry and damp industrial areas.

(Non-armoured cables : not recommended for underground burial)

MINIMUM BENDING RADIUS

Non-armoured cable	- During operation	: 6 X Overall diameter
	- During installation	: 8 X Overall diameter
Armoured cable	- During operation	: 8 X Overall diameter
	- During installation	: 10 X Overall diameter

TEMPERATURE RATING

During operation	: -30°C up to +70°C
During installation	: -10°C up to +50°C

ABBREVIATIONS

- PE : Polyethylene
- SLA : Aluminium/Polyester tape collective screen
- SWA : Steel wire armour
- PSLA : Aluminium/Polyester tape pair screen
- PVC : Polyvinyl Chloride

MULTITRIPLE CABLE

Table 5 Collective Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	1	0.5	0.8	5.5	44	0.8	5.6	0.9	1.3	10	195
	2		1.1	9.5	100	1.1	9.7	0.9	1.4	14.5	340
	3		1.1	10.5	115	1.1	10.3	0.9	1.4	15	375
	5		1.2	12.5	175	1.2	12.5	1.25	1.5	18	570
	10		1.3	17.5	325	1.3	17.5	1.6	1.7	24	1,010
	15		1.3	19.5	435	1.3	19.5	1.6	1.8	26.5	1,190
	20		1.5	22.5	570	1.5	22.3	1.6	1.9	29.5	1,430
0.50mm² (7/0.30mm)	1	0.6	0.8	6.5	51	0.8	6.3	0.9	1.3	10.5	220
	2		1.1	11	110	1.1	11	0.9	1.5	16	390
	3		1.1	11.5	135	1.1	11.6	0.9	1.5	16.5	425
	5		1.2	14	200	1.2	14.2	1.25	1.6	20	650
	10		1.3	20	380	1.3	20	1.6	1.7	26.5	1,140
	15		1.5	22.5	520	1.5	22.7	1.6	1.8	29.5	1,380
	20		1.7	26	680	1.7	25.8	2.0	1.9	33.5	1,860
0.75mm² (1/0.96mm)	1	0.6	0.8	6.5	57	0.8	6.4	0.9	1.3	11	225
	2		1.1	11	125	1.1	11.2	0.9	1.5	16	405
	3		1.1	12	155	1.1	11.9	0.9	1.5	16.5	450
	5		1.2	14.5	235	1.2	14.5	1.25	1.6	20	695
	10		1.3	20.5	445	1.3	20.5	1.6	1.8	27.5	1,235
	15		1.5	23.5	615	1.5	23.3	1.6	1.8	30	1,495
	20		1.7	26.5	810	1.7	26.5	2.0	1.9	34.5	2,015
0.75mm² (7/0.37mm)	1	0.6	0.8	6.5	61	0.8	6.7	0.9	1.3	11	235
	2		1.1	12	135	1.1	11.8	0.9	1.5	16.5	430
	3		1.2	13	175	1.2	12.8	1.25	1.5	18.5	575
	5		1.2	15.5	255	1.2	15.3	1.25	1.6	21	735
	10		1.3	21.5	485	1.3	21.7	1.6	1.8	28.5	1,310
	15		1.5	24.5	670	1.5	24.7	1.6	1.9	31.5	1,600
	20		1.7	28	880	1.7	28.1	2.0	2.0	36	2,160
1.0mm² (1/1.13mm)	1	0.6	0.8	7	68	0.8	6.8	0.9	1.3	11	245
	2		1.1	12	150	1.1	11.9	0.9	1.5	16.5	445
	3		1.2	13	190	1.2	12.8	1.25	1.5	18.5	595
	5		1.2	15.5	285	1.2	15.4	1.25	1.6	21	770
	10		1.3	22	545	1.3	21.8	1.6	1.8	28.5	1,375
	15		1.5	25	765	1.5	24.9	1.6	1.9	32	1,710
	20		1.7	28.5	1,000	1.7	28.3	2.0	2.0	36.5	2,305
1.0mm² (7/0.43mm)	1	0.6	0.8	7	72	0.8	7.1	0.9	1.3	11.5	255
	2		1.2	13	165	1.2	12.8	1.25	1.5	18.5	570
	3		1.2	13.5	205	1.2	13.6	1.25	1.6	19.5	640
	5		1.2	16.5	305	1.2	16.3	1.25	1.6	22	815
	10		1.5	23.5	605	1.5	23.6	1.6	1.9	30.5	1,505
	15		1.5	26.5	815	1.5	26.4	1.6	1.9	33.5	1,815
	20		1.7	30	1,070	1.7	30.0	2.0	2.0	38	2,450
1.5mm² (7/0.53mm)	1	0.6	0.8	8	92	0.8	7.8	0.9	1.4	12.5	290
	2		1.2	14	210	1.2	14	1.25	1.6	19.5	660
	3		1.2	15	265	1.2	14.9	1.25	1.6	20.5	735
	5		1.3	18	410	1.3	18.2	1.6	1.7	25	1,110
	10		1.5	26	805	1.5	26	1.6	1.9	33	1,795
	15		1.7	29.5	1,125	1.7	29.5	2.0	2.0	37.5	2,490
	20		1.9	33.5	1,475	1.9	33.5	2.0	2.1	41.5	2,995

MULTITRIPLE CABLE

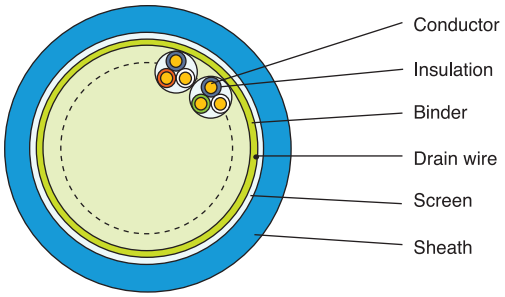
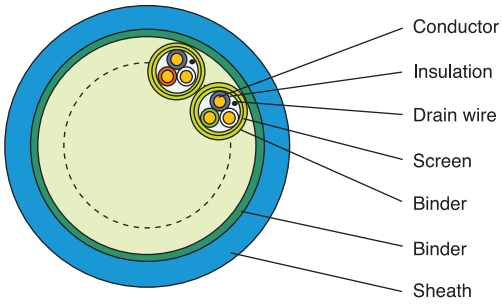
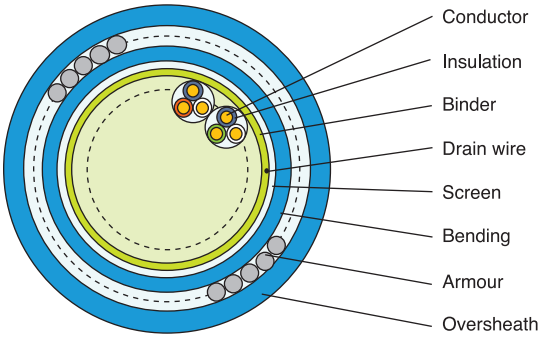
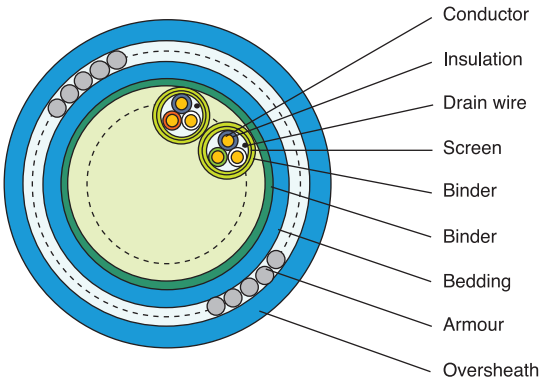
Table 6 Individual Triple Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PE/PVC-SLA (Non-Armoured Cable)			PE/PE/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	2	0.5	1.1	10.5	110	1.1	10.6	0.9	1.4	15	365
	3		1.1	11	130	1.1	11.2	0.9	1.5	16	415
	5		1.2	13.5	200	1.2	13.7	1.25	1.5	19	630
	10		1.3	19.5	375	1.3	19.3	1.6	1.7	26	1,120
	15		1.3	21.5	500	1.3	21.5	1.6	1.8	28.5	1,330
	20		1.5	24.5	655	1.5	24.5	1.6	1.9	31.5	1,595
0.50mm² (7/0.30mm)	2	0.6	1.1	12	125	1.1	11.9	0.9	1.5	16.5	425
	3		1.1	12.5	150	1.1	12.6	0.9	1.5	17.5	465
	5		1.2	15.5	230	1.2	15.4	1.25	1.6	21	715
	10		1.3	22	435	1.3	21.8	1.6	1.8	28.5	1,285
	15		1.5	25	600	1.5	24.9	1.6	1.8	31.5	1,540
	20		1.7	28.5	785	1.7	28.3	2.0	1.9	36	2,085
0.75mm² (1/0.96mm)	2	0.6	1.1	12	140	1.1	12.1	0.9	1.5	17	445
	3		1.2	13	180	1.2	13.1	1.25	1.5	18.5	595
	5		1.2	16	265	1.2	15.8	1.25	1.6	21.5	760
	10		1.3	22.5	505	1.3	22.4	1.6	1.8	29	1,355
	15		1.5	25.5	695	1.5	25.5	1.6	1.9	32.5	1,675
	20		1.7	29	915	1.7	29.0	2.0	2.0	37	2,260
0.75mm² (7/0.37mm)	2	0.6	1.2	13	160	1.2	13	1.25	1.5	18.5	565
	3		1.2	14	195	1.2	13.8	1.25	1.5	19.5	620
	5		1.2	16.5	285	1.2	16.6	1.25	1.6	22.5	805
	10		1.5	24	570	1.5	24.1	1.6	1.8	31	1,475
	15		1.5	27	755	1.5	26.9	1.6	1.9	34	1,775
	20		1.7	30.5	990	1.7	30.6	2.0	2.0	38.5	2,400
1.0mm² (1/1.13mm)	2	0.6	1.2	13	170	1.2	13.1	1.25	1.5	18.5	585
	3		1.2	14	210	1.2	13.9	1.25	1.5	19.5	650
	5		1.2	17	315	1.2	16.8	1.25	1.6	22.5	840
	10		1.5	24	630	1.5	24.2	1.6	1.8	31	1,555
	15		1.5	27	850	1.5	27.1	1.6	1.9	34	1,885
	20		1.7	31	1,115	1.7	30.9	2.0	2.0	39	2,525
1.0mm² (7/0.43mm)	2	0.6	1.2	13.5	185	1.2	13.7	1.25	1.5	19	610
	3		1.2	14.5	225	1.2	14.6	1.25	1.6	20.5	690
	5		1.2	17.5	340	1.2	17.7	1.25	1.6	23.5	885
	10		1.5	25.5	675	1.5	25.6	1.6	1.9	32.5	1,655
	15		1.5	28.5	910	1.5	28.7	1.6	2.0	36	2,020
	20		1.7	32.5	1,195	1.7	32.6	2.0	2.1	41	2,710
1.5mm² (7/0.53mm)	2	0.6	1.2	15	230	1.2	15	1.25	1.6	20.5	705
	3		1.2	16	290	1.2	16	1.25	1.6	21.5	790
	5		1.3	19.5	450	1.3	19.6	1.6	1.7	26	1,210
	10		1.5	28	885	1.5	28.2	1.6	1.9	35	1,960
	15		1.7	32	1,235	1.7	32	2.0	2.1	40	2,725
	20		1.9	36.5	1,620	1.9	36.4	2.0	2.3	45	3,315

MULTITRIPLE CABLE

Table 7 Colour Code (Triple Identification)							
Type of triple	a-wire	b-wire	c-wire	No. of triple	Typr of triple		
					center	1st layer	2nd layer
1	Black	White	Red	1	1	-	-
2	Black	White	Green	2	-	1, 2	-
3	Black	White	Yellow	3	-	1~3	-
4	Black	White	Brown	5	-	1~5	-
5	Black	White	Blue	10	-	1, 2	1~6, 2, 3
6	Black	White	Orange	15	-	1~4	1~6, 2~6
				20	1	1~6	1~6, 2~6, 3, 4

Table 4 Electrial Characteristics									
Electrical Requirements \ Conductor size		mm2 (no./mm)	0.5 (1/0.80)	0.5 (7/0.30)	0.75 (1/0.96)	0.75 (7/0.37)	1.0 (1/1.13)	1.0 (7/0.43)	1.5 (7/0.53)
Conductor resistance at 20°C	(Ω/km)	Max.	36.8	36.7	25.0	25.0	18.4	18.5	12.3
Insulation resistance at 20°C	(MΩ.km)	Min.	5000						
Mutual capacitance at 1 kHz	(nF/km)								
- Collective screen : one-pair & two-pair cable		Max.	115						120
: all other cable			75						85
- Individual screen			115						120
Capacitance unbalance at 1kHz	(pF/250m)	Max.	250						
Inductance / Resistance ratio, L/R	(μH/Ω)	Max.	25						40
Voltage test for 1 minute — Core to core	(kV)		1						
Voltage test for 1 minute — Core to screen	(kV)		1						

MULTITRIPLE CABLE : CROSS-SECTIONAL OF CABLE

PE/PVC-SLA Collective Screen (Non-armoured Cable)	PE/PVC-TSLA Individual Triple Screen (Non-armoured Cable)
	
PE/PE/SWA/PVC-SLA Collective Screen (Armoured Cable)	**PE/PE/SWA/PVC-TSLA Individual Triple Screen (Armoured Cable)**
	

MULTIPAIR CABLE

APPLICABLE STANDARDS

BS 5308 Part 2 (Type 1 & Type 2)
BS 6746/ BS 7655
BS 6360 (IEC 60228)
BS 4066 Part 1 (IEC 60332-1) & IEC 60332-3 (if required)

CONSTRUCTION

Conductor	:	Plain annealed copper wires according to BS 6360 (IEC 60228)
Insulation	:	PVC compound type TI1 according to BS 6746/ BS 7655
Colour code	:	White and Black (numbering on White core)
Pairing	:	Cores twisted to pairs (two pair cable can be manufactured as a quad for collective screen cables)
Binder	:	Non-hygroscopic Polyester tape
Drain wire	:	Tinned annealed copper wire 0.5mm2 (1/0.80mm)
Screen	:	Aluminium/Polyester tape approx. 0.022mm thick over Drain wire
Bedding (Inner sheath)	:	PVC compaund type TM1 Black colour according to BS 6746/ BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic compound (LSNHFR) to BS 4066 Part 1&3 (IEC 60332-1&3) if required.
Armour	:	Galvanized steel wires
Sheath/Oversheath	:	PVC compound type TM 1 Black colour according to BS 6746 / BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic compound (LSNHFR) to BS 4066 Part 1&3 (IEC 60332-1&3) if required.
Cable Identification	:	Manufacturer's name and voltage

APPLICATION

For transmission of analogue and digital signals in and around process plants in dry and damp industrial areas.

(Non-armoured cables : not recommended for underground burial)

MINIMUM BENDING RADIUS

Non-armoured cable	- During operation	: 6 X Overall diameter
	- During installation	: 8 X Overall diameter
Armoured cable	- During operation	: 8 X Overall diameter
	- During installation	: 10 X Overall diameter

TEMPERATURE RATING

During operation	: -30°C up to +70°C
During installation	: -10°C up to +50°C

ABBREVIATIONS

- PVC : Polyvinyl choloride
- SLA : Aluminium/Polyester tape collective screen
- SWA : Steel wire armour
- PSLA : Aluminium/Polyester tape pair screen

MULTIPAIR CABLE

Table 9 Collective Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-SLA (Non-armoured cable)			PVC/PVC/SWA/PVC-SLA (Armoured cable)						
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	
0.50mm² (1/0.80mm)	1	0.5	0.8	5.5	39	0.8	5.4	0.9	1.3	10	195	
	2		0.8	6	57	0.8	6.1	0.9	1.3	10.5	225	
	3		0.9	8.5	83	0.9	8.4	0.9	1.4	13	315	
	5		1.1	10.5	130	1.1	10.6	0.9	1.4	15	420	
	10		1.2	14	230	1.2	14.2	1.25	1.6	20	730	
	15		1.2	17	325	1.2	16.9	1.25	1.6	22.5	915	
	20		1.3	19.5	425	1.3	19.3	1.6	1.7	26	1,255	
	24		1.3	21	495	1.3	20.8	1.6	1.7	27.5	1,395	
	30		1.3	23	600	1.3	23.0	1.6	1.8	30	1,595	
0.50mm² (7/0.30mm)	1	0.6	0.8	6	45	0.8	6	0.9	1.3	10.5	205	
	2		0.8	7	66	0.8	6.8	0.9	1.3	11	250	
	3		0.9	9.5	96	0.9	9.4	0.9	1.4	14	355	
	5		1.1	12	150	1.1	12	0.9	1.5	17	485	
	10		1.2	16	270	1.2	16.2	1.25	1.6	22	845	
	15		1.3	19.5	385	1.3	19.4	1.6	1.7	26	1,220	
	20		1.3	22	495	1.3	22	1.6	1.8	29	1,460	
	24		1.3	24	580	1.3	23.9	1.6	1.8	30.5	1,625	
	30		1.5	26.5	725	1.5	26.7	1.6	1.9	33.5	1,915	
0.75mm² (1/0.96mm)	1	0.6	0.8	6	50	0.8	6.1	0.9	1.3	10.5	220	
	2		0.8	7	75	0.8	7	0.9	1.3	11.5	265	
	3		0.9	9.5	105	0.9	9.6	0.9	1.4	14	370	
	5		1.1	12.5	170	1.1	12.3	0.9	1.5	17	510	
	10		1.2	16.5	310	1.2	16.6	1.25	1.6	22.5	895	
	15		1.3	20	450	1.3	19.9	1.6	1.7	26.5	1,305	
	20		1.3	22.5	575	1.3	22.6	1.6	1.8	29.5	1,565	
	24		1.5	25	695	1.5	24.9	1.6	1.8	31.5	1,780	
	30		1.5	27.5	850	1.5	27.4	1.6	1.9	34.5	2,055	
0.75mm² (7/0.37mm)	1	0.6	0.8	6.5	54	0.8	6.4	0.9	1.3	11	230	
	2		0.8	7.5	81	0.8	7.3	0.9	1.4	12	280	
	3		1.1	10.5	125	1.1	10.6	0.9	1.4	15	410	
	5		1.2	13	190	1.2	13.2	1.25	1.5	18.5	655	
	10		1.3	17.5	345	1.3	17.7	1.6	1.7	24.5	1,125	
	15		1.3	21	490	1.3	21.1	1.6	1.8	28	1,410	
	20		1.5	24.5	650	1.5	23.9	1.6	1.8	31	1,720	
	24		1.5	26.5	765	1.5	26.4	1.6	1.9	33.5	1,925	
	30		1.7	29.5	955	1.7	29.1	2.0	2.0	37.5	2,540	

MULTIPAIR CABLE

Table 9 (Cont'd) Collective Screen											
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-SLA (Non-Armoured Cable)			PVC/PVC /SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
1.0mm² (1/1.13mm)	1	0.6	0.8	6.5	58	0.8	6.4	0.9	1.3	11	235
	2		0.8	7.5	89	0.8	7.4	0.9	1.4	12	290
	3		1.1	10.5	135	1.1	10.6	0.9	1.4	15	430
	5		1.2	13	210	1.2	13.2	1.25	1.5	18.5	670
	10		1.2	17.5	375	1.2	17.7	1.25	1.7	23.5	1010
	15		1.3	21.5	545	1.3	21.3	1.6	1.8	28	1,465
	20		1.5	24.5	725	1.5	24.5	1.6	1.8	31.5	1,790
	24		1.5	26.5	855	1.5	26.6	1.6	1.9	33.5	2,030
	30		1.5	29.5	1,045	1.5	29.3	1.6	2.0	36.5	2,365
1.0mm² (7/0.43mm)	1	0.6	0.8	6.5	62	0.8	6.7	0.9	1.3	11	245
	2		0.8	8	95	0.8	7.8	0.9	1.4	12.5	305
	3		1.1	11	145	1.1	11.2	0.9	1.5	16	465
	5		1.2	14	225	1.2	14	1.25	1.5	19.5	715
	10		1.3	19	415	1.3	18.9	1.6	1.7	25.5	1,245
	15		1.3	22.5	590	1.3	22.5	1.6	1.8	29.5	1,585
	20		1.5	26	785	1.5	26	1.6	1.9	33	1,945
	24		1.5	28	925	1.5	28.2	1.6	1.9	35	2,185
	30		1.7	31.5	1,155	1.7	31.5	2.0	2.0	39.5	2,830
1.5mm² (7/0.53mm)	1	0.6	0.8	7.5	77	0.8	7.3	0.9	1.4	12	280
	2		0.9	8.5	125	0.9	8.7	0.9	1.4	13.5	355
	3		1.2	12.5	195	1.2	12.5	1.25	1.5	18	630
	5		1.2	15.5	295	1.2	15.4	1.25	1.6	21	840
	10		1.3	21	545	1.3	20.9	1.6	1.8	27.5	1,465
	15		1.5	25.5	805	1.5	25.3	1.6	1.9	32.5	1,940
	20		1.5	28.5	1,040	1.5	28.7	1.6	2.0	36	2,350
	24		1.7	31.5	1,255	1.7	31.6	2.0	2.0	39.5	2,965
	30		1.7	35	1,540	1.7	34.9	2.0	2.1	43	3,435

MULTIPAIR CABLE

Table 10 Individual Pair Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-PSLA (Non-Armoured Cable)			PVC/PVC/SWA/PVC-PSLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	2	0.5	0.9	9.5	85	0.9	9.4	0.9	1.4	14	335
	3		1.1	10.5	110	1.1	10.4	0.9	1.4	15	375
	5		1.2	12.5	165	1.2	12.6	1.25	1.5	18	590
	10		1.2	17.5	300	1.2	17.5	1.25	1.7	23.5	875
	15		1.3	19.5	405	1.3	19.7	1.6	1.7	26.5	1,200
	20		1.3	22	510	1.3	22.1	1.6	1.8	29	1,400
	24		1.5	25.5	650	1.5	25.6	1.6	1.9	32.5	1,680
	30		1.5	27	760	1.5	27.1	1.6	1.9	34	1,850
0.50mm² (7/0.30mm)	2	0.6	1.1	11	105	1.1	10.9	0.9	1.5	15.5	400
	3		1.1	11.5	130	1.1	11.6	0.9	1.5	16.5	435
	5		1.2	14	190	1.2	14.2	1.25	1.6	20	665
	10		1.3	20	360	1.3	20.0	1.6	1.8	27	1,175
	15		1.5	23	495	1.5	22.8	1.6	1.8	29.5	1,410
	20		1.5	25.5	625	1.5	25.5	1.6	1.9	32.5	1,655
	24		1.5	29	770	1.5	29.1	1.6	1.9	36	1,925
	30		1.7	31.5	925	1.7	31.3	2.0	2.1	39.5	2,455
0.75mm² (1/0.96mm)	2	0.6	1.1	11	115	1.1	11.2	0.9	1.5	16	410
	3		1.1	12	140	1.1	11.9	0.9	1.5	16.5	450
	5		1.2	14.5	215	1.2	14.5	1.25	1.6	20	700
	10		1.3	20.5	405	1.3	20.5	1.6	1.7	27	1,225
	15		1.3	23	540	1.3	22.9	1.6	1.8	29.5	1,470
	20		1.5	26	710	1.5	26.1	1.6	1.9	33	1,760
	24		1.5	30	875	1.5	29.8	1.6	1.9	37	2,055
	30		1.7	32	1,055	1.7	32.0	2.0	2.0	40	2,600
0.75mm² (7/0.37mm)	2	0.6	1.1	12	125	1.1	11.8	0.9	1.5	16.5	435
	3		1.2	12.5	160	1.2	12.7	1.25	1.5	18	585
	5		1.2	15.5	235	1.2	15.3	1.25	1.6	21	745
	10		1.3	21.5	445	1.3	21.6	1.6	1.8	28.5	1,315
	15		1.5	24.5	615	1.5	24.6	1.6	1.9	31.5	1,605
	20		1.7	28	800	1.7	28.0	2.0	2.0	36	2,160
	24		1.7	32	985	1.7	31.9	2.0	2.0	40	2,530
	30		2.0	34.5	1,200	2.0	34.5	2.0	2.2	43	2,905

MULTIPAIR CABLE

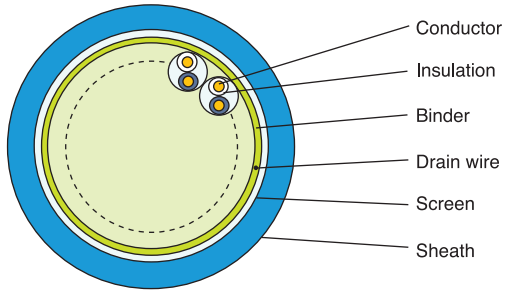
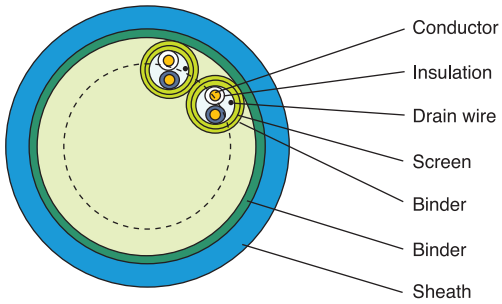
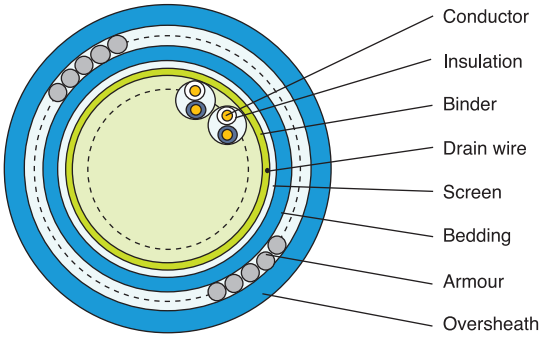
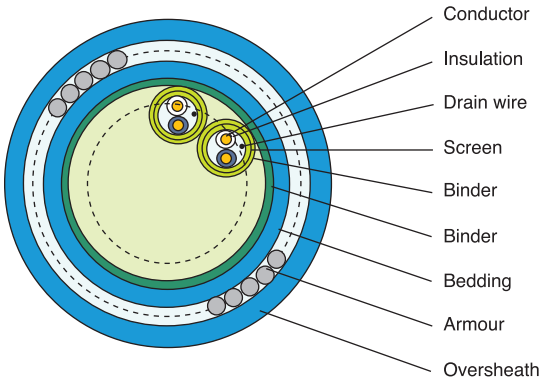
Table 10 (Cont'd) Individual Pair Screen

Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-PSLA (Non-Armoured Cable)			PVC/PVC/SWA/PVC-PSLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
1.0mm² (1/1.13mm)	2	0.6	1.1	12	135	1.1	11.8	0.9	1.5	16.5	435
	3		1.2	13	170	1.2	12.8	1.25	1.5	18.5	600
	5		1.2	15.5	255	1.2	15.4	1.25	1.6	21	765
	10		1.3	22	485	1.3	21.8	1.6	1.8	28.5	1,360
	15		1.5	25	670	1.5	24.8	1.6	1.9	32	1,680
	20		1.7	28	880	1.7	28.2	2.0	2.0	36	2,265
	24		1.7	32	1,080	1.7	32.1	2.0	2.0	40	2,625
	30		2.0	34.5	1,320	2.0	34.7	2.0	2.2	43	3,025
1.0mm² (7/0.43mm)	2	0.6	1.2	12.5	155	1.2	12.7	1.25	1.5	18	575
	3		1.2	13.5	185	1.2	13.4	1.25	1.5	19	635
	5		1.2	16	275	1.2	16.2	1.25	1.6	22	810
	10		1.3	23	525	1.3	23.0	1.6	1.8	30	1,455
	15		1.5	26	725	1.5	26.2	1.6	1.9	33	1,780
	20		1.5	29.5	925	1.5	29.4	1.6	2.0	36.5	2,115
	24		1.7	34	1,170	1.7	34.0	2.0	2.1	42	2,825
	30		2.0	36.5	1,425	2.0	36.7	2.0	2.2	45	3,225
1.5mm² (7/0.53mm)	2	0.6	1.2	14	185	1.2	13.8	1.25	1.6	19.5	650
	3		1.2	14.5	235	1.2	14.7	1.25	1.6	20.5	720
	5		1.3	18	355	1.3	18.0	1.6	1.7	24.5	1,090
	10		1.5	26	700	1.5	25.8	1.6	1.9	33	1,730
	15		1.7	29.5	965	1.7	29.3	2.0	2.0	37.5	2,385
	20		1.7	33	1,235	1.7	32.8	2.0	2.1	41	2,830
	24		2.0	38	1,570	2.0	38.1	2.0	2.2	46.5	3,435
	30		2.0	40.5	1,850	2.0	40.4	2.5	2.4	50	4,245

Table 11 Electrical Characteristics

Electrical Requirements \ Conductor size		mm2 (no./mm)	0.5 (1/0.80)	0.5 (7/0.30)	0.75 (1/0.96)	0.75 (7/0.37)	1.0 (1/1.13)	1.0 (7/0.43)	1.5 (7/0.53)
Conductor resistance at 20°C	(Ω/km)	Max.	36.8	36.7	25.0	25.0	18.4	18.5	12.3
Insulation resistance at 20°C	(MΩ.km)	Min.	25						
Mutual capacitance at 1 kHz	(nF/km)	Max.	250						
Capacitance between any core or screen at 1kHz	(nF/km)	Max.	450						
Inductance / Resistance ratio, L/R	(μH/Ω)	Max.	25						40
Voltage test for 1 minute — Core to core	(kV)		1						
Voltage test for 1 minute — Core to screen	(kV)		1						

MULTIPAIR CABLE CROSS : SECTIONAL OF CABLE

PVC/PVC-SLA Collective Screen (Non-armoured Cable)	PVC/PVC-PSLA Individual Pair Screen (Non-armoured Cable)
	
PVC/PVC/SWA/PVC-SLA Collective Screen (Armoured Cable)	**PVC/PVC/SWA/PVC-PSLA Individual Pair Screen (Armoured Cable)**
	

MULTITRIPLE CABLE

APPLICABLE STANDARDS

BS 5308 Part 2 (Type 1 & Type 2)
BS 6746 / BS 7655
BS 6360 (IEC 60228)
BS 4066 Part 1 (IEC60332-1) & IEC 60332-3 (if required)

CONSTRUCTION

Conductor	:	Plain annealed copper wires according to BS 6360 (IEC 60228)
Insulation	:	PVC compound type TI1 according to BS 6746/ BS 7655
Colour code	:	White, Black and Red (numbering White core)
Tripling	:	Cores twisted to triples
Binder	:	Non-hygroscopic Polyester tape
Drain wire	:	Tinned annealed copper wire 0.5mm2 (1/0.80mm)
Screen	:	Aluminium/Polyester tape approx. 0.022mm thick over Drain wire
Bedding (Inner sheath)	:	PVC compound type TM1 Black colour according to BS 6746/ BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic compound (LSNHFR) to BS 4066 Part 1&3 (IEC 60332-1&3) if required.
Armour	:	Galvanized steel wires
Sheath/Oversheath	:	PVC compound type TM1 Black colour according to BS 6746/BS 7655, Flame retardant to BS 4066 Part 1 (IEC 60332-1) or Low smoke, Non-halogen and Flame retardant thermoplastic Compoun (LSNHFR) to BS 4066 Part 1&3 (IEC 60332-1&3 if required.
Cable Identification	:	Manufacturer's name and voltage

APPLICATION

For transmission of analogue and digital signals in and around process plants in dry and damp industrial areas.

(Non-armoured cables : not recommended for underground burial)

MINIMUM BENDING RADIUS

Non-armoured cable	- During operation	: 6 X Overall diameter
	- During installation	: 8 X Overall diameter
Armoured cable	- During operation	: 8 X Overall diameter
	- During installation	: 10 X Overall diameter

TEMPERATURE RATING

During operation	: -30°C up to +70°C
During installation	: -10°C up to +50°C

ABBREVIATIONS

- PVC : Polyvinyl choloride
- SLA : Aluminium/Polyester tape collective screen
- SWA : Steel wire armour
- TSLA : Aluminium/Polyester tape triple screen

MULTITRIPLE CABLE

Table 12 Collective Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-SLA (Non-Armoured Cable)			PVC/PVC/SWA/PVC-SLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	1	0.5	0.8	5.5	47	0.8	5.6	0.9	1.3	10	205
	2		1.1	9.5	105	1.1	9.7	0.9	1.4	14.5	360
	3		1.1	10.5	125	1.1	10.3	0.9	1.4	15	395
	5		1.2	12.5	190	1.2	12.5	1.25	1.5	18	605
	10		1.3	17.5	360	1.3	17.5	1.6	1.7	24	1,070
	15		1.3	19.5	480	1.3	19.5	1.6	1.8	26.5	1,270
	20		1.5	22.5	630	1.5	22.3	1.6	1.9	29.5	1,535
0.50mm² (7/0.30mm)	1	0.6	0.8	6.5	55	0.8	6.3	0.9	1.3	10.5	230
	2		1.1	11	120	1.1	11	0.9	1.5	16	415
	3		1.1	11.5	150	1.1	11.6	0.9	1.5	16.5	455
	5		1.2	14	225	1.2	14.2	1.25	1.6	20	695
	10		1.3	20	425	1.3	20	1.6	1.7	26.5	1,220
	15		1.5	22.5	590	1.5	22.7	1.6	1.8	29.5	1,495
	20		1.7	26	770	1.7	25.8	2.0	1.9	33.5	2,010
0.75mm² (1/0.96mm)	1	0.6	0.8	6.5	61	0.8	6.4	0.9	1.3	11	235
	2		1.1	11	135	1.1	11.2	0.9	1.5	16	430
	3		1.1	12	170	1.1	11.9	0.9	1.5	16.5	480
	5		1.2	14.5	255	1.2	14.5	1.25	1.6	20	740
	10		1.3	20.5	490	1.3	20.5	1.6	1.8	27.5	1,315
	15		1.5	23.5	680	1.5	23.3	1.6	1.8	30	1,610
	20		1.7	26.5	895	1.7	26.5	2.0	1.9	34.5	2,165
0.75mm² (7/0.37mm)	1	0.6	0.8	6.5	66	0.8	6.7	0.9	1.3	11	250
	2		1.1	12	145	1.1	11.8	0.9	1.5	16.5	460
	3		1.2	13	190	1.2	12.8	1.25	1.5	18.5	610
	5		1.2	15.5	280	1.2	15.3	1.25	1.6	21	790
	10		1.3	21.5	535	1.3	21.7	1.6	1.8	28.5	1,405
	15		1.5	24.5	750	1.5	24.7	1.6	1.9	31.5	1,730
	20		1.7	28	980	1.7	28.1	2.0	2.0	36	2,330
1.0mm² (1/1.13mm)	1	0.6	0.8	7	72	0.8	6.8	0.9	1.3	11	255
	2		1.1	12	160	1.1	11.9	0.9	1.5	16.5	470
	3		1.2	13	205	1.2	12.8	1.25	1.5	18.5	630
	5		1.2	15.5	310	1.2	15.4	1.25	1.6	21	820
	10		1.3	22	595	1.3	21.8	1.6	1.8	28.5	1,460
	15		1.5	25	835	1.5	24.9	1.6	1.9	32	1,835
	20		1.7	28.5	1,100	1.7	28.3	2.0	2.0	36.5	2,470
1.0mm² (7/0.43mm)	1	0.6	0.8	7	78	0.8	7.1	0.9	1.3	11.5	265
	2		1.2	13	180	1.2	12.8	1.25	1.5	18.5	600
	3		1.2	13.5	225	1.2	13.6	1.25	1.6	19.5	680
	5		1.2	16.5	335	1.2	16.3	1.25	1.6	22	870
	10		1.5	23.5	665	1.5	23.6	1.6	1.9	30.5	1,615
	15		1.5	26.5	905	1.5	26.4	1.6	1.9	33.5	1,955
	20		1.7	30	1,190	1.7	30	2.0	2.0	38	2,635
1.5mm² (7/0.53mm)	1	0.6	0.8	8	100	0.8	7.8	0.9	1.4	12.5	305
	2		1.2	14	225	1.2	14	1.25	1.6	19.5	695
	3		1.2	15	290	1.2	14.9	1.25	1.6	20.5	780
	5		1.3	18	445	1.3	18.2	1.6	1.7	25	1,180
	10		1.5	26	875	1.5	26	1.6	1.9	33	1,915
	15		1.7	29.5	1,230	1.7	29.5	2.0	2.0	37.5	2,660
	20		1.9	33.5	1,615	1.9	33.5	2.0	2.1	41.5	3,220

MULTITRIPLE CABLE

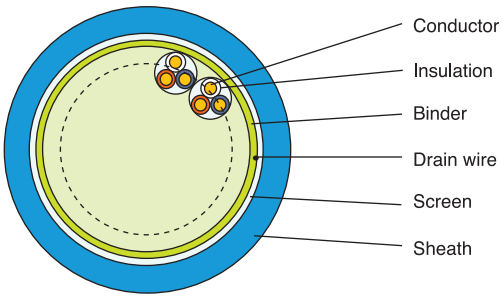
Table 13 Individual Triple Screen												
Conductor Size	No.of Pair	Insulation Thickness Nom. (mm)	PVC/PVC-TSLA (Non-Armoured Cable)			PVC/PVC/SWA/PVC-TSLA (Armoured Cable)					
			Sheath Thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)	Bedding Thickness Nom. (mm)	Diameter Over Bedding Approx. (mm)	Armour Wire Diameter Nom. (mm)	Sheath thickness Nom. (mm)	Overall Diameter Approx. (mm)	Weight Approx. (kg/km)
0.50mm² (1/0.80mm)	2	0.5	1.1	10.5	105	1.1	10.6	0.9	1.4	15	390
	3		1.1	11	140	1.1	11.2	0.9	1.5	16	440
	5		1.2	13.5	215	1.2	13.7	1.25	1.5	19	665
	10		1.3	19.5	405	1.3	19.3	1.6	1.7	26	1,180
	15		1.3	21.5	545	1.3	21.5	1.6	1.8	28.5	1,415
	20		1.5	24.5	715	1.5	24.5	1.6	1.9	31.5	1,705
0.50mm² (7/0.30mm)	2	0.6	1.1	12	135	1.1	11.9	0.9	1.5	16.5	450
	3		1.1	12.5	165	1.1	12.6	0.9	1.5	17.5	495
	5		1.2	15.5	250	1.2	15.4	1.25	1.6	21	765
	10		1.3	22	480	1.3	21.8	1.6	1.8	28.5	1,370
	15		1.5	25	665	1.5	24.9	1.6	1.8	31.5	1,660
	20		1.7	28.5	875	1.7	28.3	2.0	1.9	36	2,240
0.75mm² (1/0.96mm)	2	0.6	1.1	12	150	1.1	12.1	0.9	1.5	17	470
	3		1.2	13	190	1.2	13.1	1.25	1.5	18.5	630
	5		1.2	16	285	1.2	15.8	1.25	1.6	21.5	810
	10		1.3	22.5	545	1.3	22.4	1.6	1.8	29	1,440
	15		1.5	25.5	760	1.5	25.5	1.6	1.9	32.5	1,790
	20		1.7	29	1,000	1.7	29.0	2.0	2.0	37	2,415
0.75mm² (7/0.37mm)	2	0.6	1.2	13	170	1.2	13	1.25	1.5	18.5	595
	3		1.2	14	210	1.2	13.8	1.25	1.5	19.5	660
	5		1.2	16.5	310	1.2	16.6	1.25	1.6	22.5	860
	10		1.5	24	620	1.5	24.1	1.6	1.8	31	1,575
	15		1.5	27	835	1.5	26.9	1.6	1.9	34	1,910
	20		1.7	30.5	1,095	1.7	30.6	2.0	2.0	38.5	2,575
1.0mm² (1/1.13mm)	2	0.6	1.2	13	180	1.2	13.1	1.25	1.5	18.5	615
	3		1.2	14	225	1.2	13.9	1.25	1.5	19.5	690
	5		1.2	17	340	1.2	16.8	1.25	1.6	22.5	890
	10		1.5	24	680	1.5	24.2	1.6	1.8	31	1,650
	15		1.5	27	925	1.5	27.1	1.6	1.9	34	2,015
	20		1.7	31	1,215	1.7	30.9	2.0	2.0	39	2,695
1.0mm² (7/0.43mm)	2	0.6	1.2	13.5	195	1.2	13.7	1.25	1.5	19	645
	3		1.2	14.5	245	1.2	14.6	1.25	1.6	20.5	730
	5		1.2	17.5	370	1.2	17.7	1.25	1.6	23.5	945
	10		1.5	25.5	735	1.5	25.6	1.6	1.9	32.5	1,765
	15		1.5	28.5	1,000	1.5	28.7	1.6	2.0	36	2,165
	20		1.7	32.5	1,310	1.7	32.6	2.0	2.1	41	2,905
1.5mm² (7/0.53mm)	2	0.6	1.2	15	245	1.2	15	1.25	1.6	20.5	755
	3		1.2	16	310	1.2	16	1.25	1.6	21.5	835
	5		1.3	19.5	485	1.3	19.6	1.6	1.7	26	1,280
	10		1.5	28	955	1.5	28.2	1.6	1.9	35	2,090
	15		1.7	32	1,340	1.7	32	2.0	2.1	40	2,900
	20		1.9	36.5	1,760	1.9	36.4	2.0	2.3	45	3,550

MULTITRIPLE CABLE

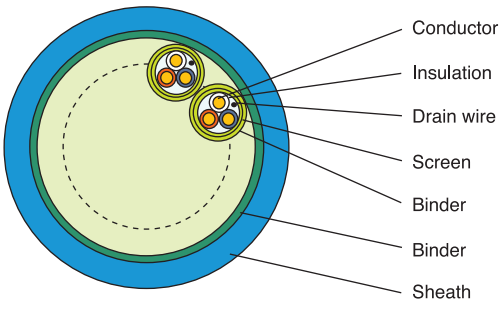
Table 14 Electarical characteristics									
Electrical requirements \ Conductor size			mm2 (no./mm)	0.5 (1/0.80)	0.5 (7/0.30)	0.75 (1/0.96)	0.75 (7/0.37)	1.0 (1/1.13)	1.0 (7/0.43)	1.5 (7/0.53)
Conductor resistance at 20°C		(Ω/km)	Max.	36.8	36.7	25.0	25.0	18.4	18.5	12.3
Insulation resistance at 20°C		(MΩ.km)	Min.	25						
Mutual capacitance at 1 kHz		(nF/km)	Max.	250						
Inductance / Resistance ratio, L/R		(μH/Ω)	Max.	25						40
Voltage test for 1 minute	Core to core	(kV)		1						
	Core to screen	(kV)		1						

MULTITRIPLE CABLE - CROSS-SECTIONAL OF CABLE

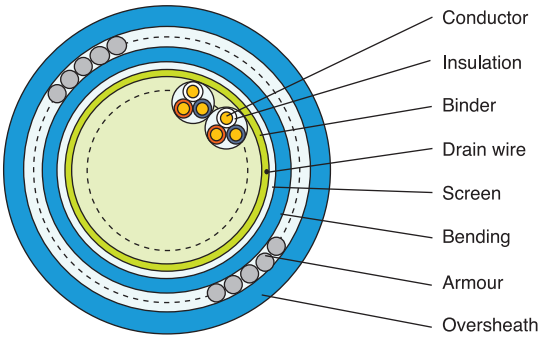
PVC/PVC-SLA Collective Screen (Non-armoured Cable)



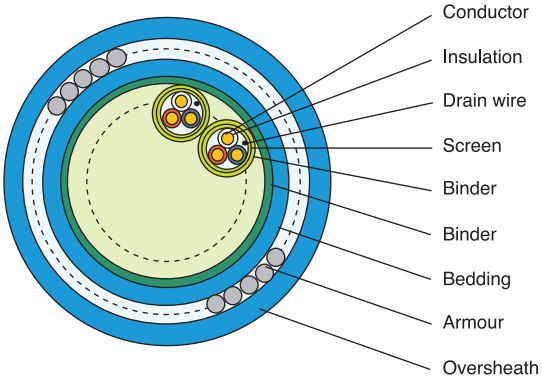
PVC/PVC-TSLA Individual Triple Screen (Non-armoured Cable)



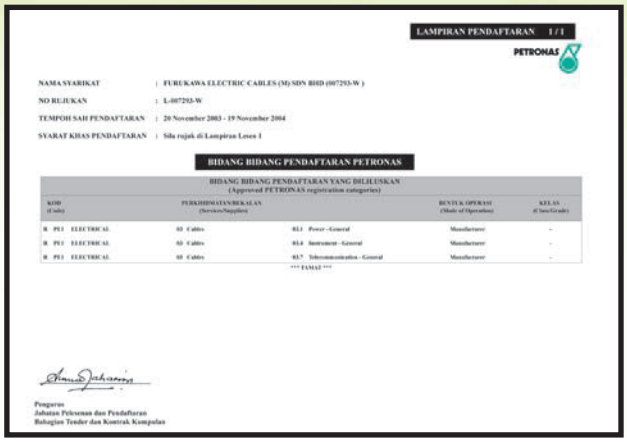
PVC/PVC/SWA/PVC-SLA Collective Screen (Armoured Cable)



PVC/PVC/SWA/PVC-TSLA Individual Triple Screen (Armoured Cable)



ACCREDITATIONS



LAMPIRAN PENDAFTARAN 1 / 1

PETRONAS

NAMA SYARIKAT : FURUKAWA ELECTRIC CABLES (M) SDN BHD (007293-W)

NO RUJUKAN : L-007293-W

TEMPOH SAH PENDAFTARAN : 20 November 2003 - 19 November 2004

SYARAT KHAS PENDAFTARAN : Sila rujuk di Lampiran Lesen 1

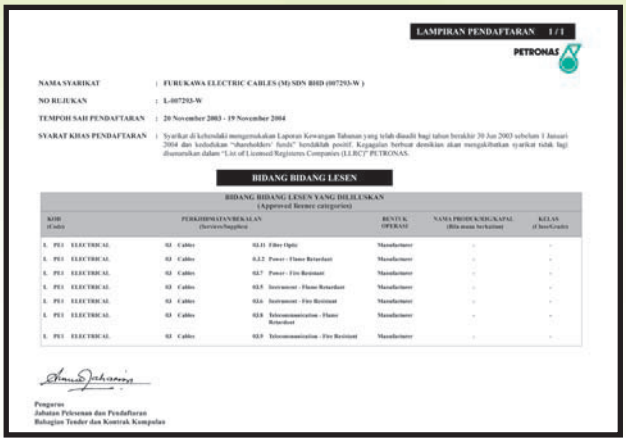
BIDANG BIDANG PENDAFTARAN PETRONAS

BIDANG BIDANG PENDAFTARAN YANG DILILUSKAN
(Approved PETRONAS registration categories)

KOD (Code)	PERKHIDMATAN/BEKALAN (Services/Supplies)		BENTUK OPERASI (Mode of Operation)	KELAS (Class/Grade)
B PS1 ELECTRICAL	03 Cables	03.1 Power - General	Manufacturer	-
B PS1 ELECTRICAL	03 Cables	03.4 Instrument - General	Manufacturer	-
B PS1 ELECTRICAL	03 Cables	03.7 Telecommunication - General	Manufacturer	-

*** TAMAT ***

Pengarah
Jabatan Pelesenan dan Pendaftaran
Bahagian Tender dan Kontrak Kumpulan



LAMPIRAN PENDAFTARAN 1 / 1

PETRONAS

NAMA SYARIKAT : FURUKAWA ELECTRIC CABLES (M) SDN BHD (007293-W)

NO RUJUKAN : L-007293-W

TEMPOH SAH PENDAFTARAN : 20 November 2003 - 19 November 2004

SYARAT KHAS PENDAFTARAN : Syarikat di kehendaki mengemukakan Laporan Kewangan Tahunan yang telah diaudit bagi tahun berakhir 30 Jun 2003 sebelum 1 Januari 2004 dan kedudukan "shareholders' funds" berdaftar positif. Kegagalan berbuat demikian akan mengakibatkan syarikat tidak lagi disenaraikan dalam "List of Licensed Registered Companies (LLRC)" PETRONAS.

BIDANG BIDANG LESEN

BIDANG BIDANG LESEN YANG DILILUSKAN
(Approved license categories)

KOD (Code)	PERKHIDMATAN/BEKALAN (Services/Supplies)		BENTUK OPERASI	NAMA PRODUK/KEDUK/KAPAL (Bila masa berkaitan)	KELAS (Class/Grade)
L PS1 ELECTRICAL	03 Cables	03.11 Fiber Optic	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.2 Power - Flame Retardant	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.7 Power - Fire Resistant	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.5 Instrument - Flame Retardant	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.6 Instrument - Fire Resistant	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.8 Telecommunication - Flame Retardant	Manufacturer	-	-
L PS1 ELECTRICAL	03 Cables	03.9 Telecommunication - Fire Resistant	Manufacturer	-	-

Pengarah
Jabatan Pelesenan dan Pendaftaran
Bahagian Tender dan Kontrak Kumpulan

PETRONAS

L 01879

LESEN MEMBEKAL PERALATAN/MEMBERI PERKHIDMATAN KEPADA
SYARIKAT-SYARIKAT CARIGALI DAN PENGELUAR MINYAK/GAS DI MALAYSIA

Pada menjalankan kuasa-kuasa yang diberi oleh Seksyen 7, Akta Kemajuan Petroliam, 1974 dan mengikut Peraturan 5, Peraturan-Peraturan Petroliam, 1974, yang diwakilkan kepada saya oleh YAB Perdana Menteri Malaysia, saya dengan ini mengeluarkan lesen dibawah Peraturan 3, Peraturan-Peraturan Petroliam ini bagi tujuan di atas kepada :-

Tarikh : 20 Novemner 2003

FURUKAWA ELECTRIC CABLES (M) SDN BHD (007293-W)
PERSIARAN RAJA MUDA, P.O. BOX 7006
40700 SHAH ALAM
SELANGOR

Butir-butir Lesen adalah seperti berikut:-

Nombor Lesen	:	L-007293-W
Tempoh Sah Lesen	:	20 November 2003 - 19 November 2004
Yuran Lesen	:	RM 1000.00
Bidang pembekal/perkhidmatan	:	Seperti di Lampiran 'BIDANG-BIDANG LESEN'.

Syarat-syarat Khas yang dikenakan ke atas Lesen ini :-

Tertakluk kepada syarat khas seperti di lampiran berkaitan.

Syarat-syarat Am Lesen ini adalah seperti yang tercatit di muka sebelah.

Pengurus Besar
Bahagian Tender dan Kontrak Kumpulan
b/p Presiden
Petroliam Nasional Berhad

BVQi

Certification

Awarded to

FEC CABLES (M) SDN BHD
Persiaran Raja Muda, P.O Box 7006
40000 Shah Alam, Selangor Darul Ehsan,
Malaysia

BVQI certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

Standards

ISO 9001:2000

Scope of supply

DESIGN, MANUFACTURE AND SALES OF:-
1. UNDERGROUND AND OVERHEAD PVC AND XLPE LOW VOLTAGE POWER CABLES
2. TELECOMMUNICATION CABLES
3. FIRE RESISTANT CABLES
4. CONTROL CABLES
5. INSTRUMENTATION CABLES
6. FLEXIBLE WIRES

Original Approval Date: 22 September 2006

Subject to the continued satisfactory operation of the organisation's Management System.

This certificate is valid until: 26 May 2009

To check this certificate validity you may contact BVQI Malaysia
Further clarification regarding the scope of this certificate and the applicability of the management system requirements may be obtained by contacting the organisation

Date: 26 September 2006

Certificate Number: 199658/A

SIRIM QAS

SIRIM QAS Sdn. Bhd.

TEST REPORT

REPORT NO : EL2001238 | PAGE : 1 OF 5

This report is NOT a Quality Assurance Certificate NOR an Approval Permit. This report refers only to samples submitted by the client to SIRIM QAS Sdn. Bhd. and tested by SIRIM QAS Sdn. Bhd. This report shall not be reproduced, except in full and shall not be used for advertising purposes by any means or forms without written approval from Executive Director SIRIM QAS Sdn. Bhd.

Issued by	:	Electrotechnical Testing Section
Issue date	:	1 4 APR 2001
Product	:	FLAME RETARDANT COMMUNICATION CABLE
Reference Standard / Method of test	:	IEC 60332-3 : 1992
Applicant	:	Furukawa Electric Cables (M) Sdn. Bhd. Persiaran Raja Muda 40000 Shah Alam, Selangor Malaysia
Manufacturer	:	Furukawa Electric Cables (M) Sdn. Bhd.
Description of sample	Size	: 10 pairs x 0.5 mm (24 AWG)
	Rated voltage	: 300/500 V
	Conductor	: Solid plain annealed copper wire
	Insulation	: Polyethylene (PE)
	Drain wire	: Solid tinned annealed copper wire
	Collective screen	: Aluminium/polyester tape
	Oversheath	: Low smoke non-halogen flame retardant (LSNOFR)
Date received	:	28 March 2001
Job No.	:	01TSD0764(K3)

Approved Signatories :

(LIM CHENG MENG)
Technical Executive

SIRIM QAS Sdn. Bhd.

(OOH TOK POH)
Senior Manager
Electrotechnical Testing Section
SIRIM QAS Sdn. Bhd.

SAFETY AND HEALTH POLICY

As one of major cable manufacturer, we strive towards ensuring a safe and preventing the occurrence of Injury and Illness at all time.
We are consistency committed towards.

- Maintaining and Continually Improving a Safe and Healthy working Environment.
- Adhering to company's Safety and Health Procedure and Regulations to Prevent Injury and Illness
- Complying with all relevant Occupational Safety and Health Legislation and Regulations

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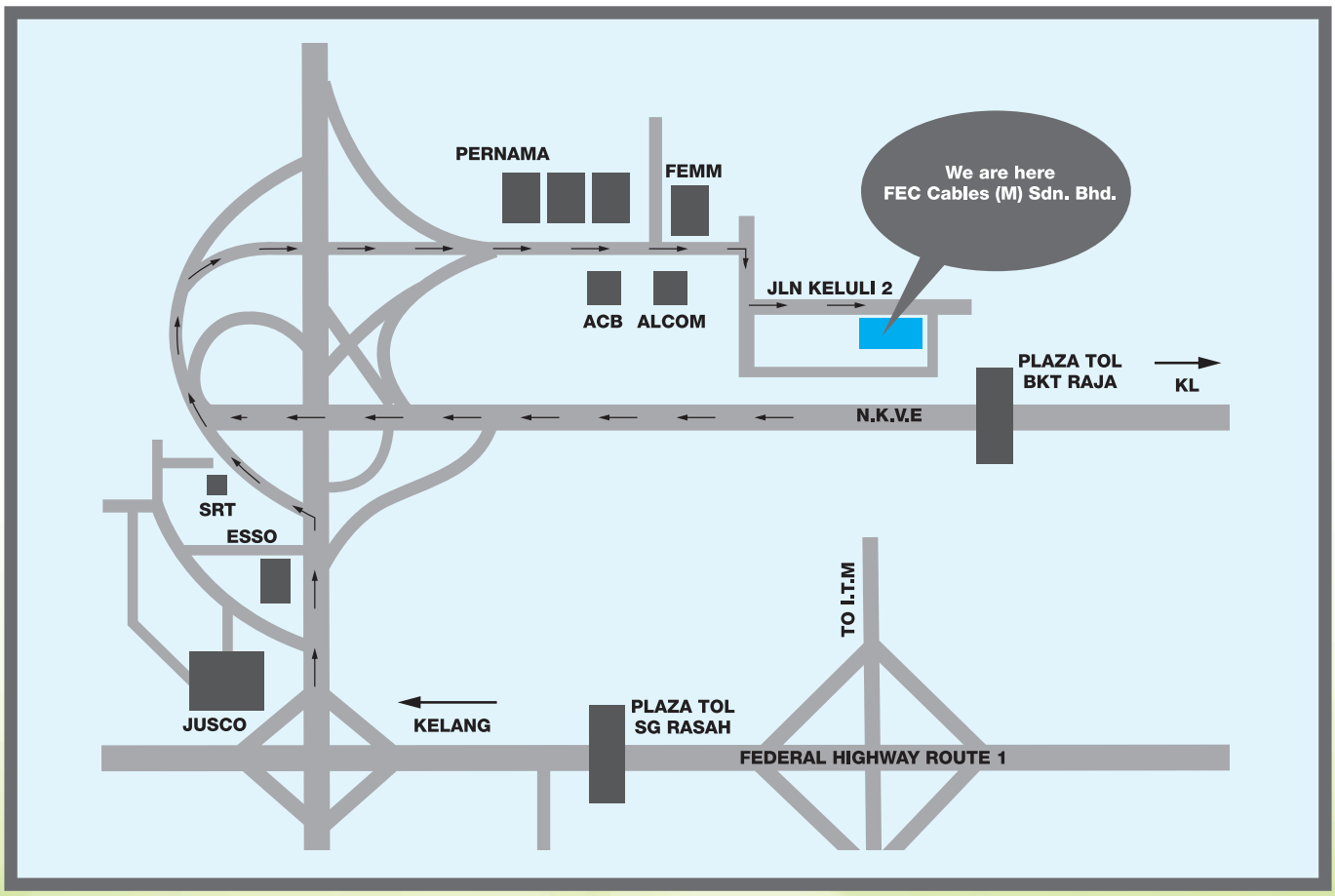
DASAR KESELAMATAN DAN KESIHATAN PEKERJAAN

Sebagai salah satu pengeluar kabel yang utama, kami berusaha ke arah memastikan keselamatan dan mencegah berlakunya Kecederaan dan Penyakit yang disebabkan oleh pekerjaan pada setiap masa.
Kami berkesungguhan secara berterusan .

- Mengekalkan dan secara berterusan meningkatkan Persekitaran kerja yang Selamat dan Sihat.
- Mematuhi Prosedur dan Peraturan syarikat berkaitan Keselamatan dan Kesihatan untuk Mencegah Kecederaan dan Penyakit pekerjaan.
- Mematuhi segala Peraturan dan Perundangan terhadap Keselamatan dan Kesihatan Pekerjaan.

Rosnizar Abdul Majid

CHIEF EXECUTIVE OFFICER
Dated this day: 1st Jan 2017



FEC CABLES (M) SDN. BHD. (7293-W)

Head Office & Factory 1 :
No. 16, Jalan Keluli 2, Bukit Raja Industrial Area,
41050 Klang, Selangor Darul Ehsan, Malaysia.
(P.O. Box 7006, 40700 Shah Alam)

Tel : 603-5519 1110 (H.Line)
Fax : 603-5519 1296 / 5513 8688
Email : sales@fec.com.my
Website : www.fec.com.my